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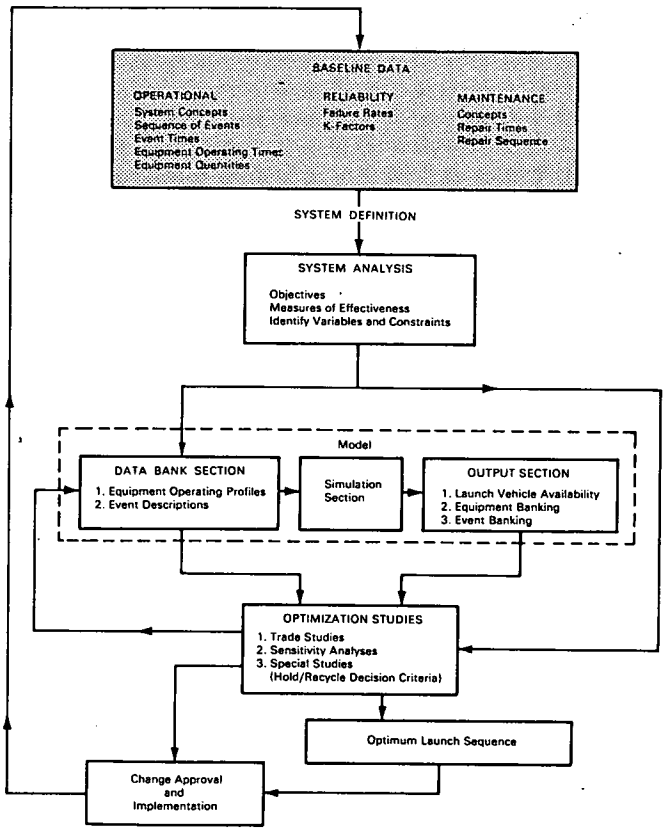
NASA TECH BRIEF

Assembly, Checkout, and Operation Optimization Analysis Technique for Complex Systems



In the assembly, checkout, and launch of a large, complex system such as the Saturn V moon rocket, the following of engineering drawings and assembly, fueling, and firing instructions falls far short of assuring mission success. A more than "educated" guess as to system, subsystem, and component performance is required, plus a rather sophisticated grasp of maintainability parameters throughout the entire vehicle.

Fortunately, currently available large digital computers are capable of accepting and storing relatively unlimited quantities of detailed data, of relating it all, and of producing dependable predictive data on operating parameters, failure vs time per system, subsystem, and component, plus maintainability potentials, when properly interrogated.

(continued overleaf)

A study has been made that proposes to reduce the foregoing considerations to an engineering management tool, by means of a computerized simulation model of the launch vehicle/ground support equipment total system. The model is used in the determination of performance parameters in three phases or modes: (1) systems optimization techniques, (2) operation analysis methodology, and (3) systems effectiveness analysis technique.

Exemplary of the approach to definition of these three operational mode studies is the illustration, which treats of the first, systems optimization techniques. The baseline data as shown by the shaded area are used to develop the computerized simulation model of the total system. Optimization studies are based on an analysis of the baseline data, data stored in the data bank, and simulation outputs. The optimization studies in turn provide inputs to the simulation model for evaluation of system sensitivity to: changes in reliability, maintainability predictions, equipment operating times, and programmed holds.

Notes:

1. These analyses should be of interest to organizations involved in the assembly, checkout, and operation of complex industrial plants having many interrelated subsystems and components.
2. Inquiries concerning these analyses may be directed to:

   Technology Utilization Officer
   Marshall Space Flight Center
   Huntsville, Alabama 35812
   Reference: B68-10222

Patent status:

No patent action is contemplated by NASA.

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